

Preparation of the NASA Air Quality Monitor for a U.S. Navy Submarine Sea Trial

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For the past 4 years, the Air Quality Monitor (AQM) has been the operational instrument for measuring trace volatile organic compounds on the International Space Station (ISS). The key components of the AQM are the inlet preconcentrator, the gas chromatograph (GC), and the differential mobility spectrometer. Onboard the ISS are two AQMs with different GC columns that detect and quantify 22 compounds. The AQM data contributes valuable information to the assessment of air quality aboard ISS for each crew increment. The US Navy is looking to update its submarine air monitoring suite of instruments and the success of the AQM on ISS has led to a jointly planned submarine sea trial of a NASA AQM. In addition to the AQM, the Navy is also interested in the Multi-Gas Monitor (MGM), which measures major constituent gases (oxygen, carbon dioxide, water vapor, and ammonia). A separate paper will present the MGM sea trial preparation and the analysis of most recent ISS data.

A prototype AQM, which is virtually identical to the operational AQM, has been readied for the sea trial. Only 1 AQM will be deployed during the sea trial, but this is sufficient for NASA purposes and to detect the compounds of interest to the US Navy for this trial. The data from the sea trial will be compared to data from archival samples collected before, during, and after the trial period.

This paper will start with a brief history of past collaborations between NASA and the U.S. and U.K. navies for trials of air monitoring equipment. An overview of the AQM technology and protocols for the submarine trial will be presented. The majority of the presentation will focus on the AQM preparation and a summary of available data from the trial.

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